Addendum to LC4620: NZLUM v0.4 2026 land use map

August 2026

Richard Law, James Ardo

Bioeconomy Science Institute Maiangi Taiao

Contract Report registration number: 2627-0013

Prepared for: Ministry of Cities, Environment, Regions and Transport

Reviewed by:
Laise Harris
Senior Researcher – Land Mapping Programme Leader
Bioeconomy Science Institute

Approved for release by:
Melissa Robson-Williams
Group Portfolio Leader – Catalysing Change
Bioeconomy Science Institute

Contents

1 Introduction

1.1 Project and client

The Ministry of Cities, Environment, Regions and Transport (MCERT) contracted the Bioeconomy Science Institute Maiangi Taiao (BSI) to produce this document as an addendum to the report LC4620, *Towards consistent land-use and management mapping: methodology and gap analysis for a pilot land-use map* (Law et al. 2025).

1.2 This document and its scope

The current document relates to those parts of report LC4620 that address the New Zealand Land Use and Management classification system (NZLUM). NZLUM v0.4 2026 is a national spatial land use data set representing land use in 2026, which implements the NZLUM v0.4 specification. Report LC4620, to which the present document is an addendum, documented the development of the NZLUM v0.3 specification itself, and the production of the NZLUM v0.3 2025 land use map of New Zealand.

The current document reports on changes to the NZLUM specification (v0.3 to v0.4) and the production of the NZLUM v0.4 2026 national land use map according to this revised specification. Substantial aspects of the work are otherwise unchanged, including the mapping methodology, hence our use of an addendum (this document) as a briefer format in which to report on updates to the process.

- The pilot NZLUM v0.3 2025 layer can be obtained at: https://lris.scinfo.org.nz/layer/122805-new-zealand-land-use-management-version-03-nzlum-v03/
- The newly created NZLUM v0.4 2026 layer can be obtained at: https://lris.scinfo.org.nz/set/7516-nzlum-v04-2026/

1.3 Further information

More information about the NZLUM programme, links to related reports, and the minutes of the meetings of the New Zealand Land Use Steering Group (NZLUSG) can be found at: https://nzlum.landcareresearch.co.nz/

2 Methodology

The NZLUM method of land-use classification does not sit clearly in one standard category of classifier; it has properties of several. The closest formal description is ‘a rule-based expert system with competitive evidence scoring’. In practical terms this means that each land-use class independently asks, “How confident am I that this piece of land belongs in this class?”

It starts from a base confidence derived from the strongest available evidence based on available spatial data (a dairy effluent consent, a district valuation land use code, a topographic feature), then applies additive adjustments (bonuses and penalties) from corroborating or contradicting evidence (Land Cover Database [LCDB] land cover, terrain slope, zoning, irrigation type, etc.). Adjustments can also be made on the basis of metadata, including recency within the same layer (more recent evidence of irrigation can carry more weight than older evidence). Hard logical exclusions rule a class out entirely where the evidence makes it impossible. Every class that fires on a cell enters a competition, and the class with the lowest (most confident) score wins. If there is an equal-confidence outcome among two or more classes, then the classifier considers the recency and geographic precision of input data. Recency and precision are expressed as an interval range of all input layers. The competitive assignment will eventually, if necessary, reach an arbitrary but deterministic class sorting function to produce a one-class-decision outcome.

The additive confidence adjustment pattern is analogous to Dempster-Shafer (DS) evidence accumulation. The DS method is a technique whereby multiple independent sources each contribute a weight of belief based on calibrated accuracy. However, since there is no calibrated accuracy available, the present NZLUM method does not use formal probabilistic machinery. The final assignment is definite (i.e. there is one winner per cell), so it cannot be considered fuzzy logic, even though the intermediate confidence scoring is ordinal. Unlike a decision-tree classifier, there is no recursive branching to a single outcome—classes run in parallel, not in sequence—hence the use of a competitive assignment process.

It would be possible, in principle, to transform this method to a more formal DS model. However, this would require replacing the present expert-assigned ordinal weights (e.g. a weight that says ‘Improved grassland cover on a farm with a pastoral zoning is worth 2 points of confidence on a 12-point scale’) with empirically-calibrated probability mass functions. These functions would express how often a given piece of evidence corresponds to a given land-use class in a ground truth data set, or to a set of plausible classes where the evidence is genuinely ambiguous (e.g. some forms of land use consent may not distinguish between dairy, intensive dry-stock, and extensive dry-stock). The main obstacle is that obtaining suitable ground truth data for NZ land use at this spatial resolution is itself non-trivial: the most readily available spatial land-use records are largely the same administrative sources already used as classification inputs, making independent calibration structurally difficult.

Perhaps the most accurate plain-language description of the NZLUM methodology is that it is a spatial knowledge-based scoring classifier. This means the rules and weights are written to reflect domain expertise rather than learned from training data. This makes it deterministic, transparent and auditable—but also means its accuracy limit is determined by how well the rules encode expert knowledge, alongside the more fundamental limitations of the quality, recency, precision and completeness of input data. The trade-off of this method versus a machine-learning approach is interpretability: it is possible in principle to read exactly why any cell got its classification. However, this technique comes at the cost of it not being easy to discover patterns in the data that the rules haven't anticipated. This makes extending the method to use more data relatively more laborious.

For further technical details of NZLUM, including how and why it uses a discrete global grid system (DGGS) for computational tractability, see: i) the report LC4620 with which this addendum is associated (Law et al. 2025); ii) preceding work developing the classification system (Law et al. 2024); iii) an associated journal article which focuses more on the use of a DGGS from an abstract geo-computational perspective (Law & Ardo 2025).

3 Review of NZLUM classification system

The existing NZLUM v0.3 classification system was reviewed in early 2026 by interested stakeholders, who together formed the New Zealand Land-use Steering Group (NZLUSG). This group is a technical body established by the MfE (now MCERT) and the Bioeconomy Science Institute Maiangi Taiao (BSI) to guide the long-term development, stewardship, and governance of the NZLUM classification system. This is to ensure that NZLUM is developed to meet a wide variety of end-user needs rather than reflecting only the knowledge, assumptions, information and priorities of MCERT and the BSI.

The aim of the NZLUSG was to bring together representatives from central and regional government, research organisations, and industry to ensure that New Zealand's land use data is coordinated, authoritative, future-proof and nationally consistent. Present membership includes representatives from the BSI, Market Economics Ltd, regional government (Hawke's Bay Regional Council; Waikato Regional Council), Land Information New Zealand (LINZ), and MCERT. The group is open to new members willing to represent their respective organisations, with a focus on ensuring a broad range of perspectives and expertise.

The group held its inaugural meeting of the group on 13 January 2026. Members were provided with an agenda, and some material to help prime their thinking about land use classification before the meeting. The agenda primarily concerned proposed changes to the NZLUM v0.3 classification system. Concrete change proposals were put forward, and decisions recorded. All decisions were made with consensus. The agenda and minutes for the NZLUSG can be found at: https://nzlum.landcareresearch.co.nz/nzlusg.

The collated actions and decisions register had 16 items in total. Several related to agreed changes to the classification system itself (i.e. together prompting the publication of NZLUM v0.4), and others related to foci for updating the map for 2026. The remaining items include notes for future sessions, decisions to make no particular changes in response to specific questions raised, or procedural decisions such as when to hold the next meeting. This report only addresses the agreed changes to the classification system and 2026 mapping practice.

Preceding the NZLUSG meeting, the BSI created an online feedback tool. This presented a web map showing the NZLUM v0.3 2025 map for the Hawke's Bay Region, alongside a survey designed to obtain broad feedback on its adequacy. Unfortunately, we obtained no feedback through this survey. Reasons for this were discussed at the NZLUSG meeting and the decision was made to keep it open for longer. However, after several months, with still no feedback obtained, the feedback website was removed because of the ongoing cost of hosting it. However, this page can be re-established quickly if desired.

3.1 Decisions of the NZLUSG

The following subsections and numbered points outline selected decisions/changes to NZLUM made by the NZLUSG.

Classification system

1 Add an explicit 5-year periodicity for rotational crops to the definition of Class 2.3.0 (Short-rotation and seasonal cropping).

2 Remove the sentence in the definition of Class 2.2.2 directing all deer, goats, and horses to the extensive dry stock class (2.2.2 Intensive dry stock; 2.2.3 Extensive dry stock).

3 Clarify that intensive parts of horse studs fit the definition of Class 2.6.4 (Horse studs) whereas extensive parts of the same may be classified under Class 2.2.3 (Extensive dry stock).

4 Establish a Class 3.1.4 (Rural residential), and a Class 2.9.0 (Smallholder farm), to distinguish peri-urban residential properties from more rural residences that do not meet a size criteria for classification as a typical commercial farm operation under Class 2 (Production agriculture and plantations). Class 3.1.4 requires that properties are between 0.4 and 2 ha in size; Class 2.9.0 requires that properties are between 2 and 40 ha but also require evidence of residential use (dwellings, lifestyle zoning, etc.).

5 Rename Class 3.6.0 (Transport and communication) to simply 'Transportation'; this class was redefined to exclude navigation and communication infrastructure, which are now instead captured under the definition of Class 3.5.8 (Navigation and communication). Note that Class 3.5.8 was formerly 3.6.5.

6 Some other minor changes had been proposed and agreed internally at the BSI before the establishment of the NZLUSG; these were also implemented in 2026 and are listed in points 6a–6d below.

  a The definition of Class 2.1.1 (Exotic plantation forestry) was expanded or clarified to be inclusive of plantation forestry for the purposes of carbon sequestration and caron credits, rather than physical commodities alone.

  b The definition of Class 1.3.4 (Production from indigenous vegetation) was clarified by referring explicitly to non-plantation native forests.

  c The labels used for Class 1.4.0 (Unused and transitioning land), Class 2.8.0 (Vacant and transitioning land), and Class 3.9.0 (Vacant and transitioning land) were adjusted so their wording was more consistent.

  d The order and labels of subclasses under Class 1.4.0, Class 2.8.0 and Class 3.9.0 were similarly changed to be more consistent, with a gradation criterion of descending likelihood of the land leaving the category in the future. For example: Class 3.9.1 (Brownfield development), Class 3.9.2 (Greenfield development), and Class 3.9.3 (Idle and derelict land).

Mapping

7 The 2025 map only mapped eight classes to the tertiary level; the rest were mapped to the secondary level. The NZLUSG agreed that for the 2026 map production, it would be a priority to map Class 2.2.0 (Grazing modified pasture systems) to the tertiary level of the classification hierarchy. That meant mapping the subclasses of Class 2.2.0, which are 2.2.1 (Dairy), 2.2.2 (Intensive dry stock), and 2.2.3 (Extensive dry stock).

8 Similarly, the NZLUSG agreed that the BSI was free to make further decisions regarding which tertiary classes under Class 3 (Built environment) to map; Class 3 was only mapped to the secondary level in 2025. After internal consideration, and given the earlier decision to redefine the subclasses of Class 3.1.0 (Residential) and create 2.9.0 (Smallholder farm), the Group made the decision to map Classes 3.1.1 (High density residential), 3.1.2 (Medium-density residential), 3.1.3 (Low-density residential), 3.1.4 (Rural residential), 3.2.1 (Outdoor

recreation), 3.2.2 (Indoor recreation), and 3.2.3 (Community services). Together with mapping 2.9.0 at the secondary level, this was intended to result in a useful elaboration of land use in peri-urban spaces.

3.2 Vocabulary

In 2026, the BSI published both NZLUM v0.3 and v0.4 using a Simple Knowledge Organization System (SKOS) concept scheme, using the Shapes Constraint Language (SHACL) for validating the vocabularies, including their hierarchical organisations.

The authors expect all future versions of NZLUM to be maintained as a versioned SKOS schema. These are available canonically in Turtle syntax, which we then use to automatically generate the webpages at: https://nzlum.landcareresearch.co.nz/classification/v0-4/system.

The SKOS schema should also be used to re-present the same information in other machine- and human-readable formats including XLSX (Excel) and Markdown. Further derived formats can be produced on an on-going basis as requested.

All classification system changes noted above were described formally as change notes using the SKOS concept scheme vocabulary. All change notes are displayed prominently on the website under definition of each class. Examples and 'scope notes' for classes are also sometimes included. Although now formally deprecated, the NZLUM v0.3 concept scheme is still available on the website; this is to allow the future interpretation of the 2025 map given that it does have important differences.

Changes to the classification system are intended to become progressively minor over time to avoid disruption to end users. We will use semantic versioning to signal the type of changes made over time (i.e. a v0.4.1 would be compatible with v0.4, while a v0.5 would have more significant departures).

4 Classification system changes

After publishing NZLUM v0.4, the authors’ attention shifted to the changes of mapping practice for the 2026 map. Primarily this meant mapping the subclasses of classes 2.2.0 (Grazing modified pasture systems), 3.1.0 (Residential), 3.2.0 (Public recreation and services), and the implementation of the newly added class 2.9.0 (Smallholder farm), through decisions about which new data to include, and what classification rules to add, change or remove.

4.1 Grazing modified pasture systems (2.2.0)

In NZLUM v0.4 2026, the former single secondary Class 2.2.0 (Grazing modified pasture systems) has been mapped into its three constituent subclasses: 2.2.1 Dairy, 2.2.2 Intensive dry stock, and 2.2.3 Extensive dry stock. The split separates dairy (where lactating stock and the milking platform drive land management) from non-dairy grazing, and further separates non-dairy grazing by intensity. This separation, given the long-standing absence of stock density information, is based on terrain and land capability as the deciding factor between an intensive and an extensive grazing regime.

Class 2.2.1 (Dairy): This covers milking platform land and dairy support land where dairy is the primary purpose, including rotations of grazed forage crops and maize for silage grown in support of the dairy operation.

- Evidence is assessed in descending order of confidence: a dairy effluent discharge consent is the strongest signal (a consent to discharge implies an active dairy shed); pastoral consent records that mention a dairy commodity; national district valuation roll [NDVR] actual-property-use code 11 (Dairy) and/or a ‘D’ (dairy) NDVR category; then LUM land cover subclass ‘502 - Grazed – dairy’ (this information can be fairly dated).
- Where irrigation records reference effluent, or a dairy effluent discharge consent is present, the cell is additionally tagged with the ancillary land-use classification of 2.7.3 (effluent land application). Dry-stock grazing on the milking platform between seasons is still intended to be treated as 2.2.1, assuming the milking platform remains the primary purpose; permanently non-lactating dairy support land should instead fall through to 2.2.2 or 2.2.3.

Classes 2.2.2 (Intensive dry stock) and 2.2.3 (Extensive dry stock); these share a common pool of pastoral evidence (NDVR actual-property-use codes for stock finishing/store livestock, pastoral consents, LUM grazed grassland, Crown Pastoral Lease tenure, etc.) but are distinguished by New Zealand Land Resource (NZLRI) terrain data.

- Flat to rolling slopes (NZLRI slope A, B, C and D) and high-capability land (Land Use Capability [LUC] Class 1–5 land) confirm intensive character and push a cell toward 2.2.2: characterised by higher inputs (fertiliser, irrigation), higher stocking rates, and enterprises such as beef finishing, lamb finishing, store livestock, and non-lactating dairy support.
- Moderately steep to precipitous slopes (NZLRI slope E–H) and low-capability land (LUC 6–7) confirm extensive character and push a cell toward 2.2.3: modified hill, hard-hill, or high-country pasture with fewer inputs and lower stocking rates.
- Where NZLRI coverage is absent (Chatham Islands, Stewart Island, and other offshore areas), cells default to 2.2.3 rather than 2.2.2, since flat-terrain evidence is required to qualify as intensive. Both 2.2.2 and 2.2.3 can produce a candidate row for the same cell; in such a case, the classification with the lower (more certain) confidence value wins through NZLUM's overall

prioritisation based on confidence primarily, using the combined recency and geographic scale intervals of input data as a tiebreaker.

We made several refinements to sharpen this 2.2.2 vs 2.2.3 distinction.

- In 2.2.3, irrigation evidence has been separated out of the land cover modifier into its own dedicated irrigation modifier, since irrigation status is not itself a land cover signal. LUM-confirmed natural or planted forest now makes 2.2.3 impossible outright (previously only a minor penalty), and the LCDB v6 classes treated as neutral ‘extensive-consistent’ cover have been narrowed to Low Producing Grassland (41), Depleted Grassland (44), and Sub-Alpine Shrubland (55).
- Class 2.2.1 now incorporates the same NZLRI slope and LUC physiographic modifiers as 2.2.2: flat, high-capability land corroborates dairy (strengthening confidence), while steep or low-capability land is penalised. This prevents 2.2.2 from winning purely on favourable terrain in cells where dairy-specific evidence (DVR, LUM, consents) is present given it can support either classification in principle.
- In 2.2.2, the penalty for evidence that contradicts an intensive dry-stock classification (previously triggered only by LUM subclass "502 - Grazed - dairy") now also triggers when a pastoral consent's commodity includes "cattle dairy". Dry-stock use of dairy run-off or wintering blocks remains possible but is treated as less likely wherever dairy-commodity evidence is present.

4.2 Smallholder farm (2.9.0)

Class 2.9.0 is a new class for NZLUM v0.4. The definition of a smallholder farm in NZLUM v0.4 is:

> A rural property larger than a rural residential property (>2 ha) but where the primary motivation is still residential rather than commercial agricultural production, and where any land management is low-intensity and incidental to the residential occupation.

This class was suggested by Haydon Jones (Waikato Regional Council,) at the meeting of the NZLUSG to bridge the apparent gap between rural residential (3.1.4; properties 0.4 to 2 ha in size) and commercial pastoral (2.2.0) or other subclasses of Class 2. The size thresholds were decided on the basis of prior work on land fragmentation.

The practical mapping of this class in NZLUM requires primary evidential data from the NDVR: properties that are > 2 ha in size, and have an ‘actual use’ code of 91 (urban residential), 21 (lifestyle; single unit) or 22 (lifestyle; multiple unit), or (at lower confidence) a ‘property code’ of LI (lifestyle improved). Improvements descriptions (a text field) is inspected for any match on a concept relating to the presence of a dwelling in general, but excludes specific descriptions relating to non-rural dwelling types (townhouses, apartments, etc.).

Confidence bonuses or penalties are applied for zoning matches or mismatches, and a sliding confidence penalty is applied as the property size approaches 40 ha such that larger properties are, all else held equal, assigned a lower confidence and therefore less likely to “win” the final classification in a given place. Properties under 10 ha have the highest confidence within this class. Any places where winter forage crops are grown are excluded, as this contradicts smallholder character. For the same reason, places with incompatible land cover classes as provided by the LCDB v6 are also excluded (indigenous forest, etc.).

The NDVR codes are defined in the Ratings Valuations Rules (RVR) 2008, which is publicly available from Land Information New Zealand (LINZ) under the resource ID: LINZS30300.

4.3 Residential (3.1.0)

In NZLUM v0.4 2026, the former single Class 3.1.0 (Residential) has been mapped according to its four subclasses, distinguishing residential land primarily by housing density and, for the lowest-density tier, by the rural/urban character of the property. The subclasses are: 3.1.1 High-density residential, 3.1.2 Medium-density residential, 3.1.3 Low-density residential, and 3.1.4 Rural residential.

Class 3.1.1 (High-density residential): This covers areas with a high concentration of housing units per unit of land area. Typically, these are multi-storey or high-rise developments in urban centres. The primary evidence is the DVR actual-property-use (APU) codes 92 (multi-unit), 93, 95, and 96, supported by category 'RA' (multi-unit buildings on strata apartments), a weaker signal on its own. Both the APU and RA designations are reinforced by any improvements-description text that indicates multi-storey or shared structures (apartment, part-floor, part-building, boarding house, residential accommodation) or large unit/flat counts. Over-sized properties, industrial zoning, or single-unit indicators rule the class out.

Class 3.1.2 Medium-density residential: This covers moderate-density suburban or semi-urban housing such as townhouses, terraces, and low-rise apartments. It is evidenced by APU codes 92 (where high-density indicators are absent), 95 (special accommodation), 96 (communal), and 22 (lifestyle multi-unit), with improvements-description indicators such as town house, terrace house, flat, and rest home. Note that APU 93 (motels, holiday parks) and 94 (hotels) are explicitly routed to Class 3.3.0 (Commercial) rather than Class 3.1.0 (Residential). Because Kāinga Ora (HNZ) properties are not represented in the DVR, the LINZ Central Record of State Land (CRoSL) is used to fill gaps to identify these. High-density indicators, over-sized properties, or industrial zoning push the cell out of this class (toward 3.1.1 or elsewhere).

Class 3.1.3 (Low-density residential): This covers single-family, one- to two-storey housing within urban boundaries; typically, large-lot or low-density residential zones with yards and landscaping. Evidence includes APU code 91 (single unit) confirmed against LINZ Topo 1:50,000 residential areas (to avoid misidentification as rural residential), APU code 97 (bach), and DVR category R (residential subcodes A/C/D/F/H/N/R), with suggestive improvements-description indicators such as dwelling, pool, sleep out, studio, double garage, bach, and cottage. As with Class 3.1.2, Kāinga Ora properties are picked up via CRoSL as a fallback. High- or medium-density indicators rule the class out, as do industrial zoning and over-sized properties—the latter instead pointing to categorisation in Class 3.1.4.

Class 3.1.4 (Rural residential): This covers residential properties in rural or peri-urban areas where land management is low-intensity and incidental to the residential occupation. Such spaces are concordant with the 'Rural lifestyle zone' of the Zone Framework Standard[1]. As a general guideline: i) properties with a dwelling between 0.4 ha and 2 ha are rural residential; ii) larger properties (> 2 ha) belong under Class 2 (Production agriculture and plantations) even where the

[1] The Zone Framework Standard is a mandatory national planning rule under the Resource Management Act that limits district plans to a set of standardised land-use zones (such as residential, commercial, industrial, and rural categories) to create consistency across local councils. Not every council has yet issued a district plan that uses this standard.

NDVR declares them residential or lifestyle; and iii) properties in the 0.4–2 ha range without a dwelling may be in transition to residential use.

The primary evidence is APU codes 21 (lifestyle single-unit) and 22 (lifestyle multi-unit) with a confirmed dwelling, APU 97 (bach in a rural area), DVR category L (lifestyle: LB, LI, LV), and only if the property is between 0.4 and 2 hectares in size. Over-sized residential properties (> 2 ha) are ruled out as Class 3 land, as are very small land areas in an urban context, and those with various high-density indicators, or industrial zoning.

This 0.4–2 ha size threshold for Class 3.1.4, and the > 2 ha threshold pushing land into Class 2, is afforded by the creation of Class 2.9.0 Smallholder farm, which was intentionally introduced to capture the gap between rural residential (3.1.4) and commercial rural production (Class 2), where a property is larger than rural-residential scale, has some evidence of production activity, but is primary motivation remains residential rather than commercial.

4.4 Public recreation and services (3.2.0)

The former single Class 3.2.0 has now been mapped into its three subclasses, separating outdoor recreation, indoor recreation, and community services. As for 2.2.0 and 3.1.0, these three land uses were previously grouped together but now draw on quite different evidence sources and also have different boundary conditions with Class 1 (conservation).

3.2.1 (Outdoor recreation): This covers land dedicated to leisure activities in natural or semi-natural settings with substantial unsealed/vegetated area: parks, trails, sportsgrounds, camping grounds, zoos, botanic gardens, and recreational reserves, including developed recreational areas outside urban boundaries (e.g. mountain-bike parks). It draws on a wide evidence base that includes: i) LINZ Topo 1:50,000 layers for purpose-built sports facilities and golf courses; ii) regionally-available Hazardous Industries and Activities List (HAIL) category C2 (gun clubs and rifle ranges); iii) racecourse reserves identified by the Protected Areas Network NZ (PAN-NZ) 2026 with an urban foundation of LCDB Urban Parkland/Open Space; iv) recreational reserves in PAN-NZ 2026 without non-indigenous land cover; and v) DVR properties with outdoor recreation use. The boundary with Class 1 is explicit: parks or reserves with significant native bush, or that are protected areas, are classified under Class 1 (specifically Class 1.1.7 [Other conserved areas], which retains indigenous-cover reserves). To some extent, Class 3.2.1 is mapped as the complement of 1.1.7, capturing reserves and open space that are more urban and non-native in land cover: recreational rather than conservation in purpose.

Class 3.2.2 (Indoor recreation): This covers facilities for recreation conducted within enclosed or semi-enclosed structures: sports centres, gyms, fitness clubs, swimming pools, and indoor sports arenas. It is identified primarily from DVR improvements descriptions indicating indoor recreational infrastructure, and is a relatively thin class given the available data. The boundary with 3.2.1 is also explicit here.

Class 3.2.3 (Community services): This covers land providing community services and facilities: educational institutions, public healthcare, libraries, museums, courts, prisons, civic buildings, emergency services, marae, religious buildings, and cemeteries. Much can be captured directly from LINZ 1:50,000 topographic data (cemeteries and many urupā), followed by the LINZ national facilities data set (which captures hospitals and schools). This is supplemented by properties identified from the NDVR with a relatively long list of relevant community-service improvements noted (fire stations, monuments, monasteries, churches, etc.).

Together, the three-way split lets each subclass of 3.2.0 draw on the evidence source best suited to it while keeping the recreation/conservation boundary with Class 1 explicit for Class 3.2.1 without affecting Classes 3.2.2 or 3.2.3. This was the primary justification for mapping to the tertiary level within 3.2.0: as PAN-NZ 2026 was significantly revised, it was noted when it was included that there was still considerable confusion for local purpose reserves as to whether they related more to conservation or recreation.

5 Input data revisions

To support the tertiary classifications described above, and generally to improve the map accuracy and currency, the authors of this report sourced and added various layers for the 2026 revision.

5.1 Land cover and capability data (LCDB and NZLRI)

LCDB v6 (including the Chatham Islands) replaces the previous LCDB v5. This is used very widely: it is used as the land-cover contradiction check in Classes 2.2.1, 2.2.2, and 2.2.3 (dairy/dry-stock), the ‘Urban Parkland/Open Space’ signal in Class 3.2.1 (Outdoor recreation), part of Class 1.3.6's (Defence land) built-up exclusion, and more. The LCDB revision brings land cover information forward from a nominal date of 2018, to 2023. There remains the possibility of using an annual, 10 m resolution Sentinel-2 derived land cover product. However, the benefit in terms of recency and spatial resolution needs to be weighed against the rich thematic detail of LCDB.

Although it is not a new layer because it was used in NZLUM v0.3 2025, the NZLRI LUC and slope layers are now used to inform the classification of Classes 2.2.1, 2.2.2, and 2.2.3 directly: flat, high-capability land (LUC 1–3, slope A/B) corroborates dairy and is penalised against dry-stock-only classifications, while steep/low-capability land (LUC 7–8, slope E–H) does the opposite. This is an adjustment made on the basis of physiographic evidence; it is only used due to the on-going absence of publicly available farm-scale stock density information. In the future, perhaps the use of agricultural production survey data at the statistical meshblock level could replace or further supplement this information in future revisions. If privacy issues could be addressed, the National Animal Identification and Tracing (NAIT) programme data also would be extremely valuable for this.

5.2 LINZ Topographic 1:50,000 layers

A small batch of additional LINZ Topo50 point features have been included. Beacons and masts (plus Chatham Islands equivalents) now feed into Class 3.5.0 (Utilities) as further evidence of built infrastructure on otherwise undifferentiated land.

Racetracks identified for topographic mapping (especially when the sport is noted) help identify horse-training/equestrian operations. This is a relatively niche land use, but a distinct and occasionally prominent one that otherwise risks being lumped in with general pastoral or rural-residential land. This problem was noted by Haydon Jones at Waikato Regional Council (a participant on the NZLUSG).

5.3 Regional council consents

A significant addition to the 2026 map revision is the additional consideration of several regional council consenting data sets. These were used primarily to broaden agricultural and forestry evidence to support classification under Class 2.1.0 (Plantation forests), and Class 2.2.0 (Grazing modified pasture systems).

Technically, this data is catalogued and ingested using Kart (a version control system for geospatial data) using date-pinned commits.[2] The intent is to capture weekly changes to these dynamic data sets, and to be able to apply future changes to the land-use classification system 'backwards' in time. Before the adoption of Kart, council consents could still be obtained via council open data application programming interfaces (APIs), but only as the current state of consents. The BSI is now using Kart to accumulate weekly changesets of these consenting data sets.

Each regional council maintains its own resource consent register, with its own schema and vocabulary for describing dairy, pastoral, forestry and irrigation/discharge activities. The 2025 map had already included consents for some regions into the classification. This 2026 revision extends that coverage to many more regional councils, so the dairy, dry-stock, and forestry subclasses (2.2.1–2.2.3) get consent-based corroboration in regions that previously had to rely on thinner evidence (LCDB, LUM, DVR) alone).

The regional/district councils (and information they provide) that are now included are listed below.

- Bay of Plenty (BOP) (dairy consents feeding into dairy effluent evidence)
- Environment Canterbury (ECAN) (general active consents for irrigation, and dairy effluent discharge)
- Environment Southland (pre-existing; expanded use)
- Greater Wellington Regional Council (dairy shed effluent consents and plantation forestry, the latter including species-level information unavailable elsewhere)
- Hawke's Bay Regional Council (pre-existing; expanded use)
- Otago Regional Council (ORC) (dairy farm consents, and intensive winter grazing consents)
- Taranaki Regional Council (TRC) (afforestation consents, and animal-waste discharge consents)
- Waikato Regional Council (dairy, general pastoral and forestry consents)
- Marlborough District Council (dairy/piggery discharge consents used to support 2.2.1 Dairy, and also 2.6.0 Intensive animal production)
- West Coast Regional Council (dairy and forestry consents)
- Horizons Regional Council (a point-geometry companion to the existing polygon regulatory-activity layer, adding more pastoral/forestry records).

Most of this set of new council consent data (i.e. BOP, ECAN, ORC, TRC, Waikato Regional Council, an additional Horizons Regional Council point layer, and the point components of Marlborough and West Coast) are published by regional councils as point geometries, not as polygons covering an entire farm.

---

[2] See: https://kartproject.org/

A resource consent record typically has one coordinate: perhaps the location of a discharge pipe, an effluent pond, or the address on the application. Alone this is inadequate to describe the boundary of the dairy or forestry operation it relates to. To make this information useful for land use classification, the pipeline takes that point and effectively asks, ‘Which property does this sit on?’, and then treats the whole property as carrying that evidence. This means that a dairy effluent consent recorded at a shed near the road ends up supporting a ‘Dairy’ classification across the whole milking platform and run-off paddocks behind it, which is the area that matters for land use.

This is a reasonable approach to deal with imperfect information, but it can mean that a single point consent can have an outsized and sometimes imprecise influence if a property is unusually large, partly leased or unused, shared between multiple distinct land uses, or if the consent location is inaccurate or misleading (e.g. a discharge point may not be coincident with the property that is the source of the discharge). To attempt to account for this, these point-based sources of evidence are assigned lower confidence than polygon evidence; they're considered corroborating evidence about a property, not direct observation.

A handful of the new layers are area-based and don't need this treatment, because they already describe an extent on the ground: the Marlborough District Council discharge polygon, the West Coast Regional Council consent shapes, and the Greater Wellington Regional Council plantation forest layers all map directly onto the land they describe.

5.4 Stats NZ urban/rural 2026

Statistics New Zealand (StatsNZ) periodically revises its layers, including its definition of which areas are considered urban or rural for statistical purposes. We used the latest revisions to produce our 2026 map.

5.5 PAN-NZ

We also updated the PAN-NZ data, which informs the majority of Class 1.1.0 (Nature conservation), to use the 2026 revision of PAN-NZ. As described in a similar addendum to this one, the 2026 revision of PAN-NZ represents more than a temporal update (Law & Ardo, 2026). It is an expansion of coverage of protected areas, corrections of errors of omission and commission, and tidier supplementary information about legislative protections, all of which is inherited by this land-use map.

Although most of the reserves itemised in PAN-NZ have not changed in terms of their extent, name, or legislative protection, the mapping from NZ legislation to IUCN protected area types was dramatically revised by the authors largely in accord with Hughes (2025). As the definition of subclasses under Class 1.1.0 is intentionally linked to IUCN categories, the mapping of this class has changed considerably.

Non-IUCN reserves (those that are unable to be categorised), as well as those that are as yet un-mapped to IUCN categories are considered alongside IUCN Category VI reserves under the implementation of Class 1.1.7 (Other conserved area). However, there are major exceptions for any Significant Natural Areas (SNAs), Ramsar List Sites, UNESCO World Heritage Sites, Crown Pastoral Leases (included instead under Class 2.2.3), and Racecourse Reserves (included instead under Class 3.2.1).

6 NZLUM v0.4 2026 map production

We produced and validated the NZLUM 2026 maps on a regional basis, as opposed to a single national data set as produced in 2025. This was to allow regional variation in validation results, reflecting the fact that different regions rely more on different sources of data than in the previous iteration and may therefore exhibit different errors. This approach also afforded an opportunity to perform regional revisions without requiring a national revision.

Figure 1 shows the map focusing on the North Island. Figure 2 shows the South Island. Note that there is more information embedded in the spatial data shown in these figures; these figures only show the assigned class and omit additional available information such as commodities, management practices, land tenure, zoning, confidence, etc.

Figures 3–10 show direct comparisons between NZLUM v0.3 2025 and v0.4 2026.

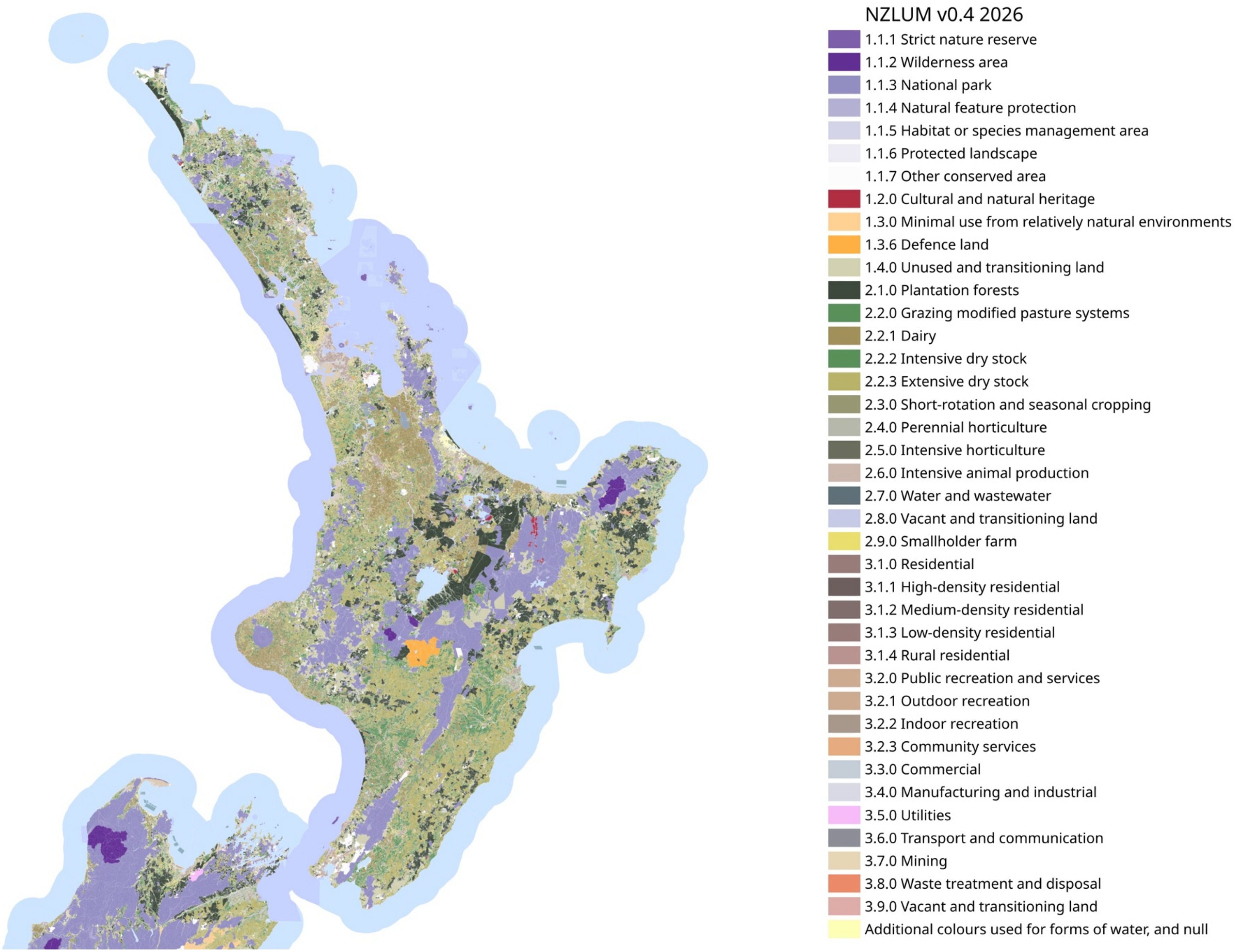

Figure 1. NZLUM v0.4 2026 (North Island).

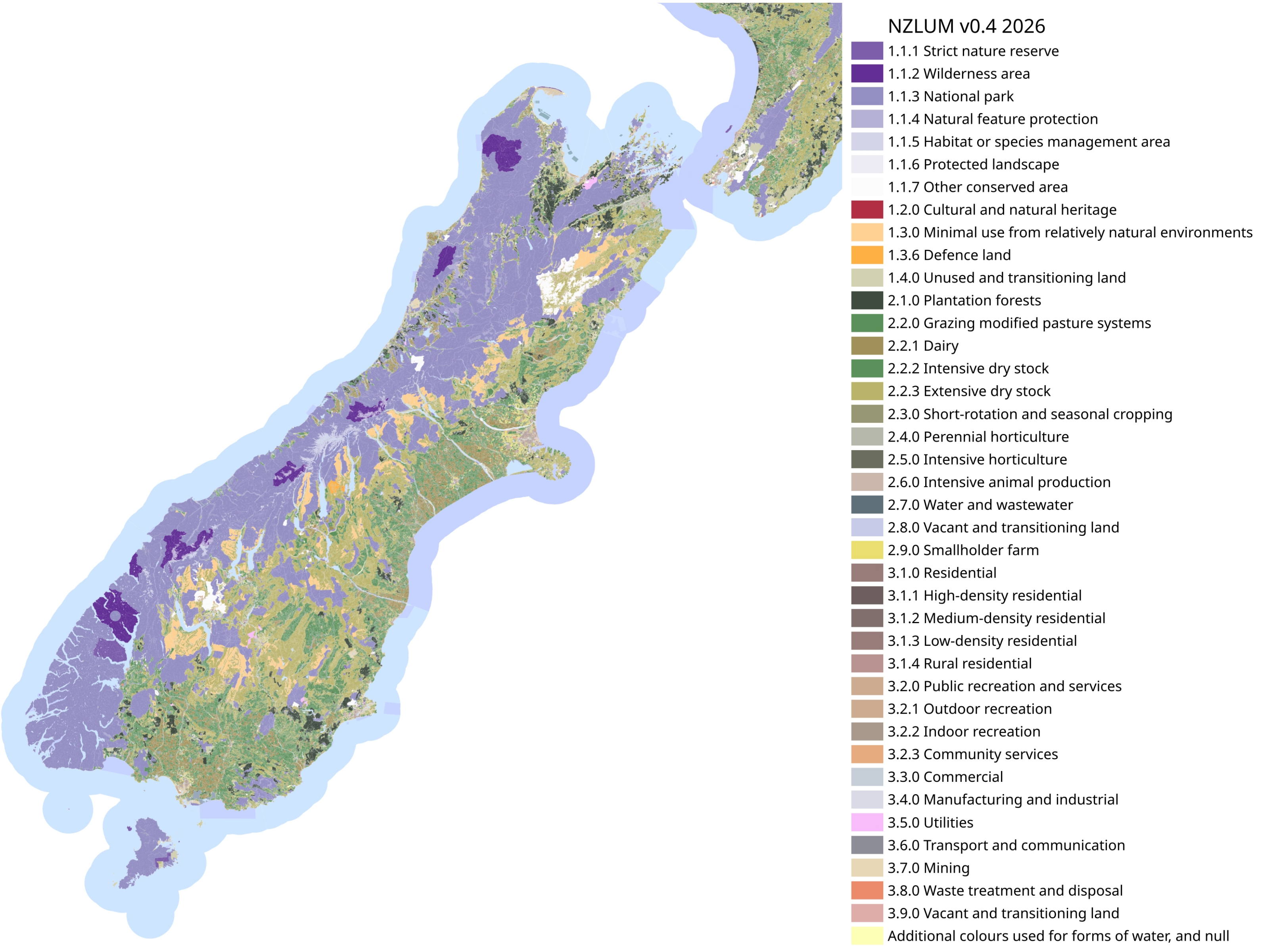

Figure 2. NZLUM v0.4 2026 (South Island).

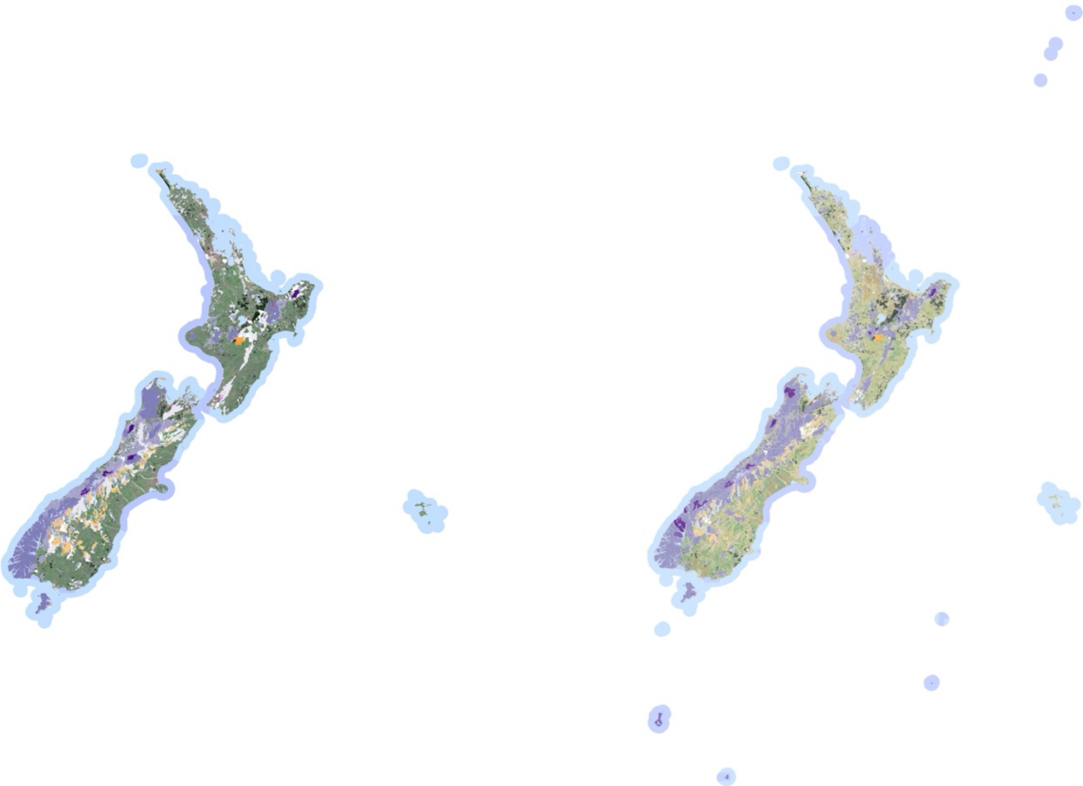

Figure 3. High-level comparisons. ***Left*****: NZLUM v0.3 2025;** ***Right*****: NZLUM v0.3 v0.4 2026. This demonstrates the additional offshore islands that have been included in 2026.**

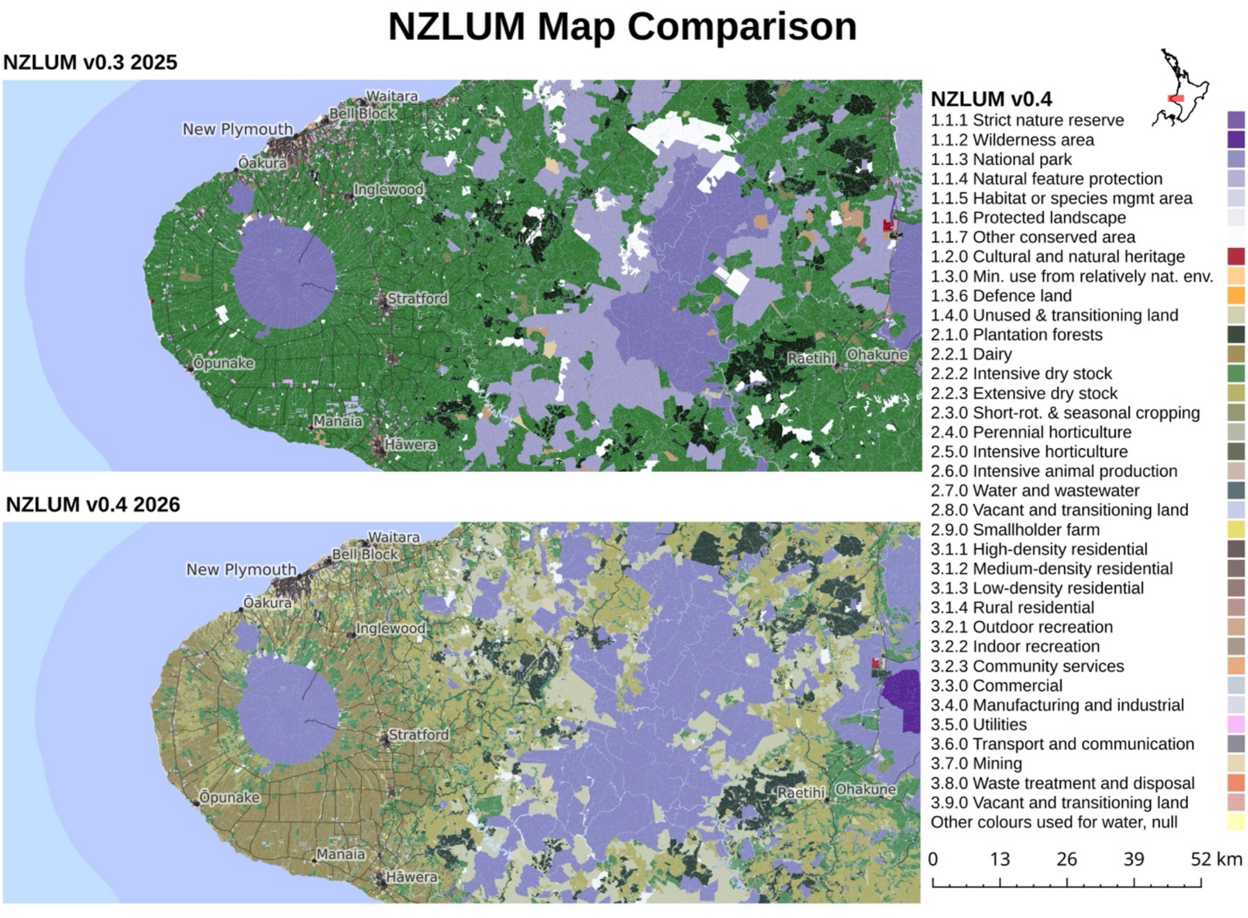

Figure 4. Comparison map focused on Taranaki.

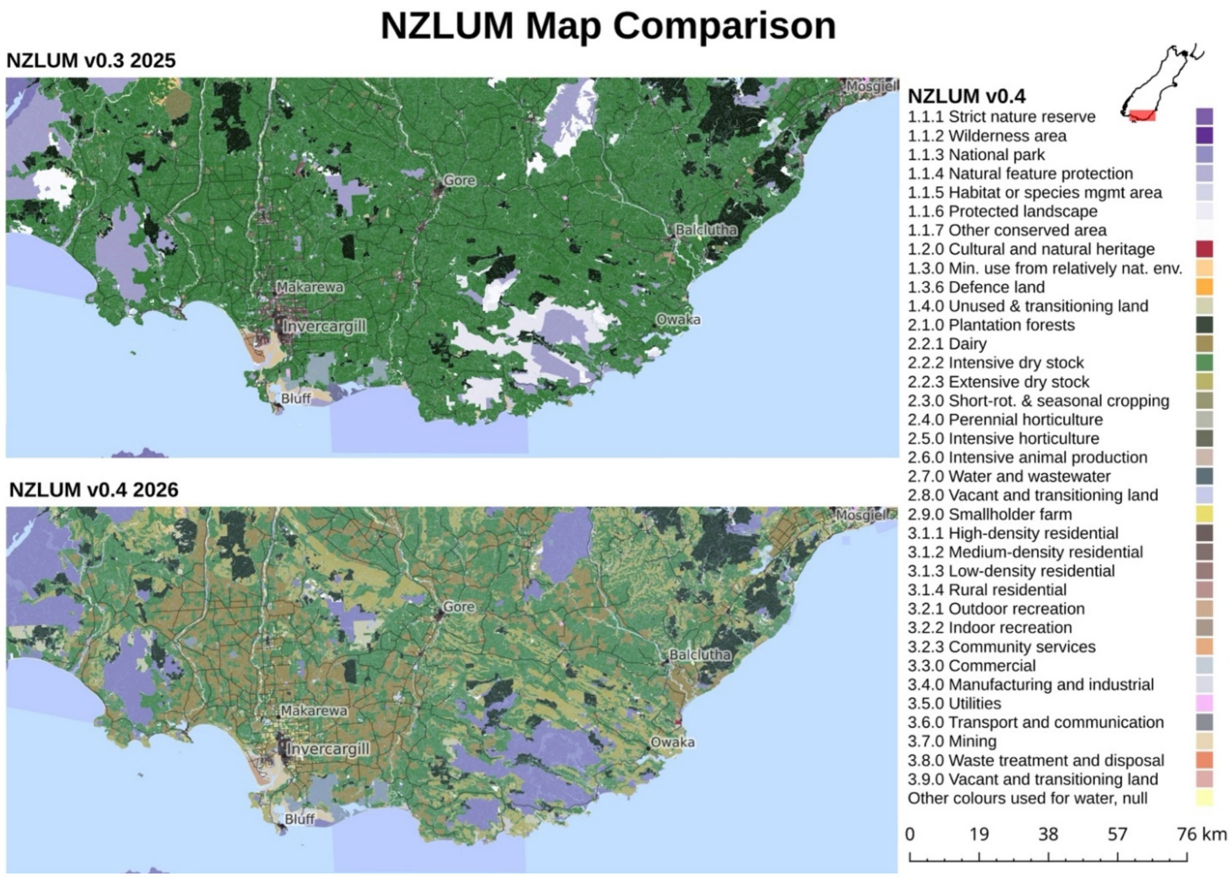

Figure 5. Comparison map focused on Southland.

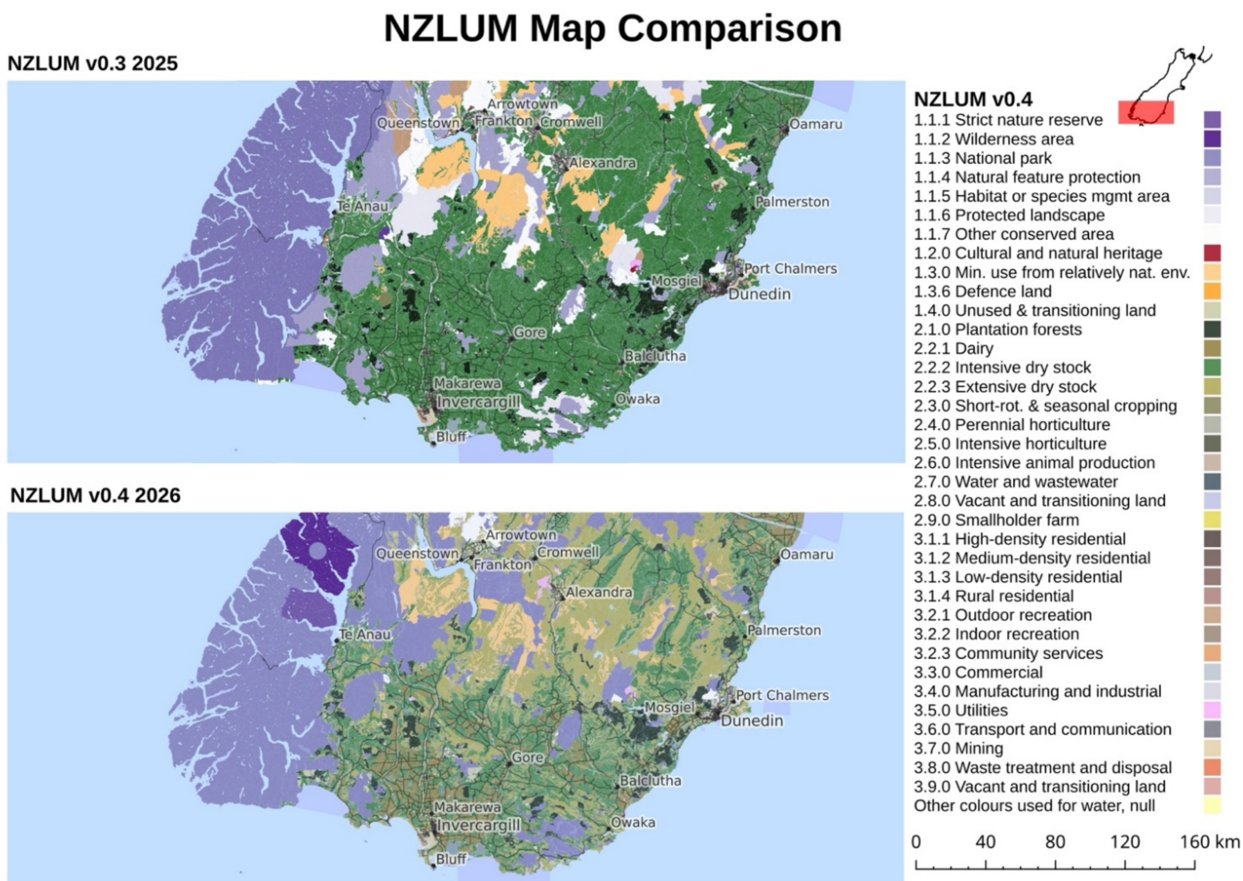

Figure 6. Comparison map focused on Southland and Otago.

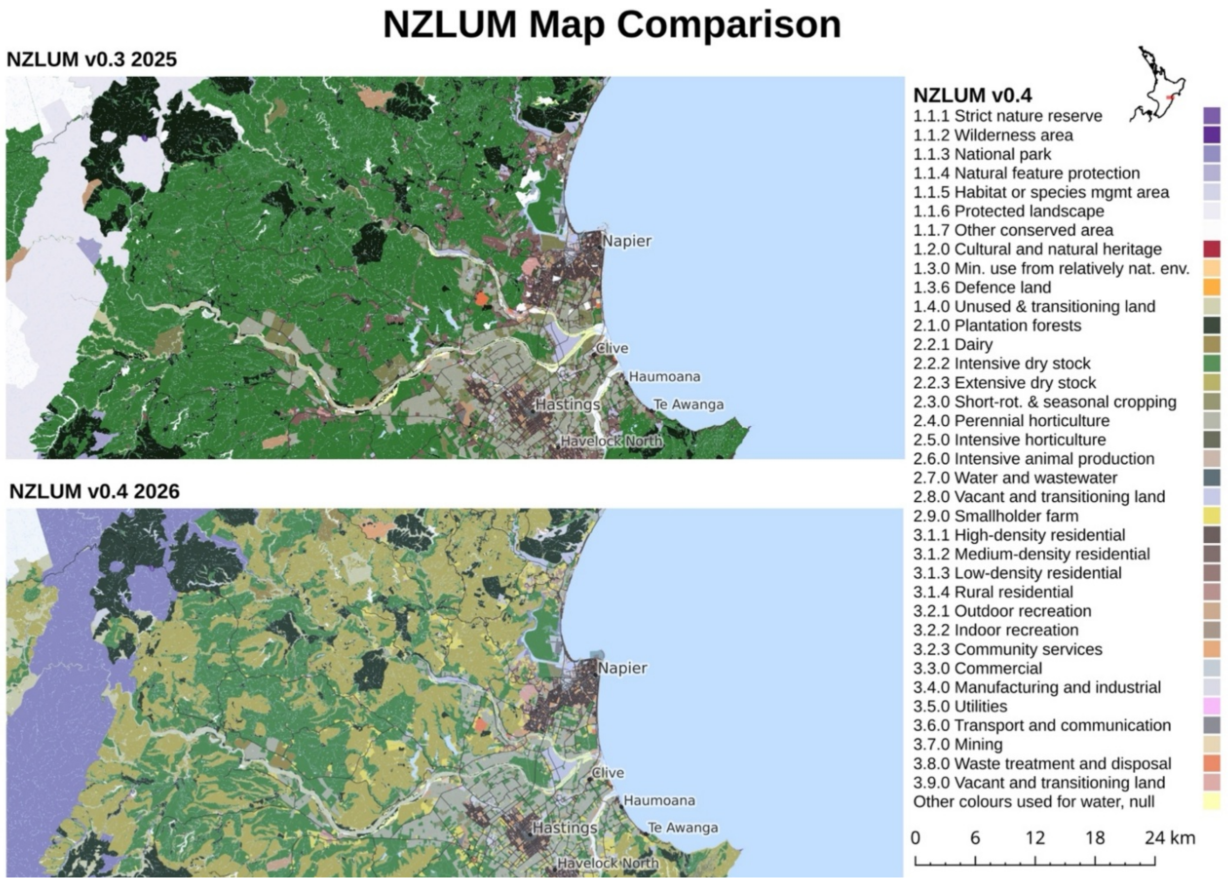

Figure 7. Comparison map focused on Hawke's Bay.

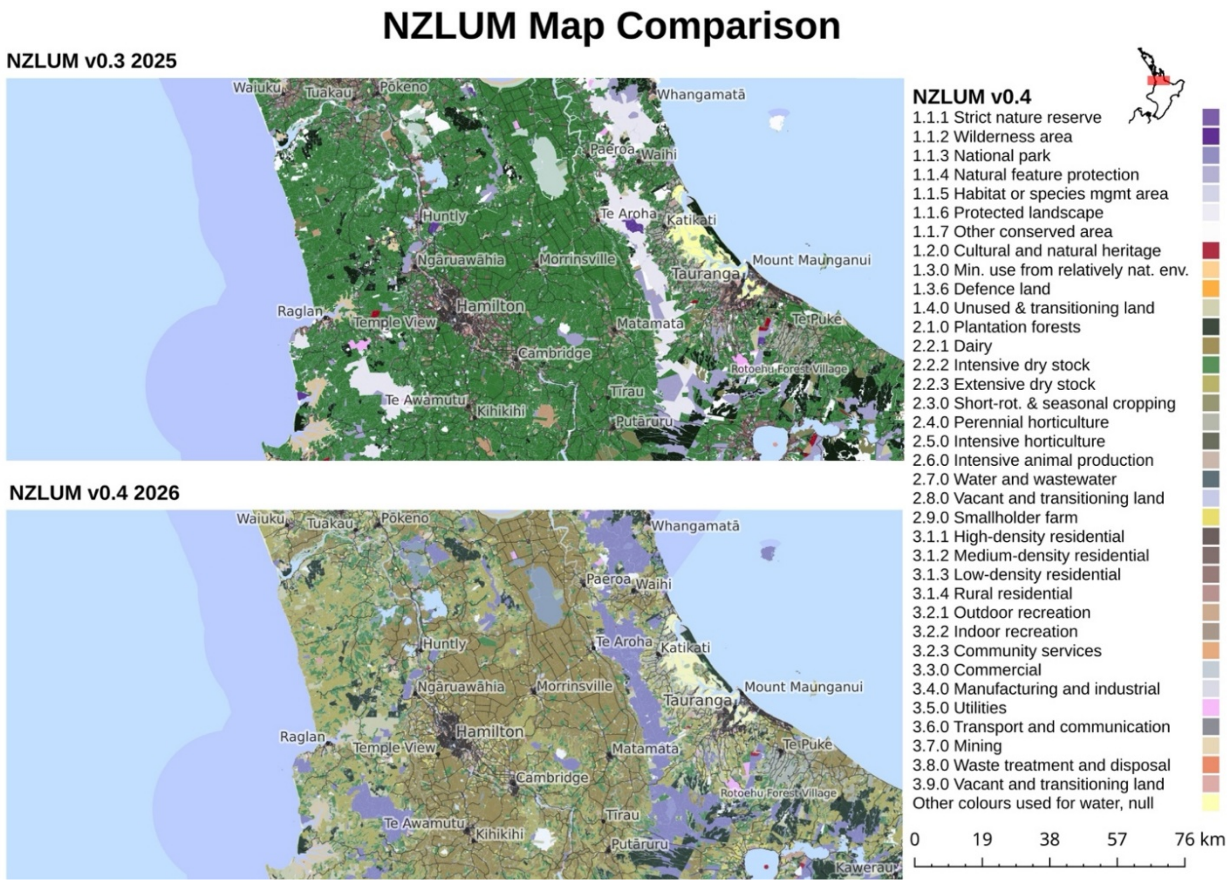

Figure 8. Comparison map focused on Waikato.

NZLUM Map Comparison

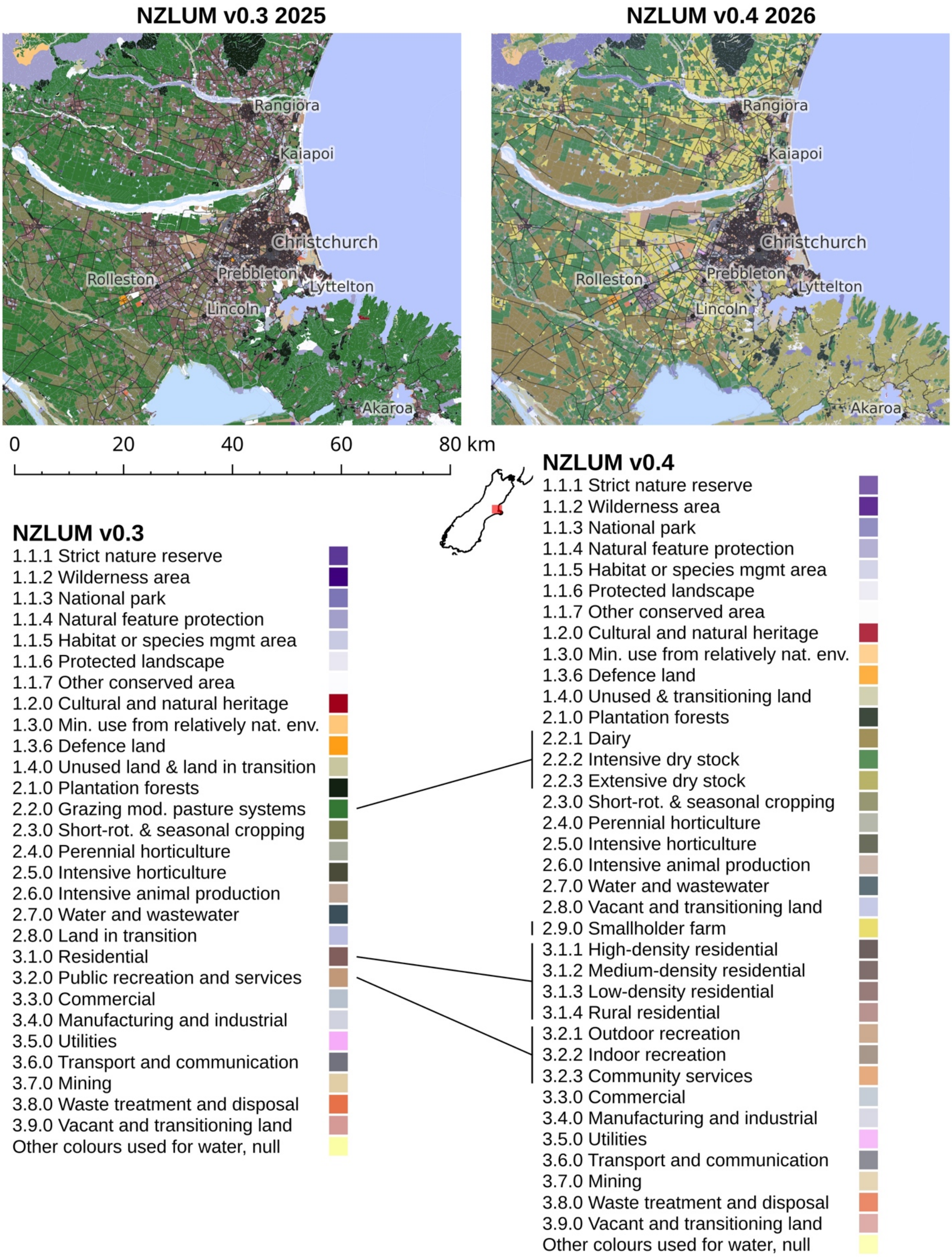

Figure 9. Comparison map focused on part of Canterbury, including an indication of additional classification detail added in NZLUM v0.4 2026.

NZLUM Map Comparison

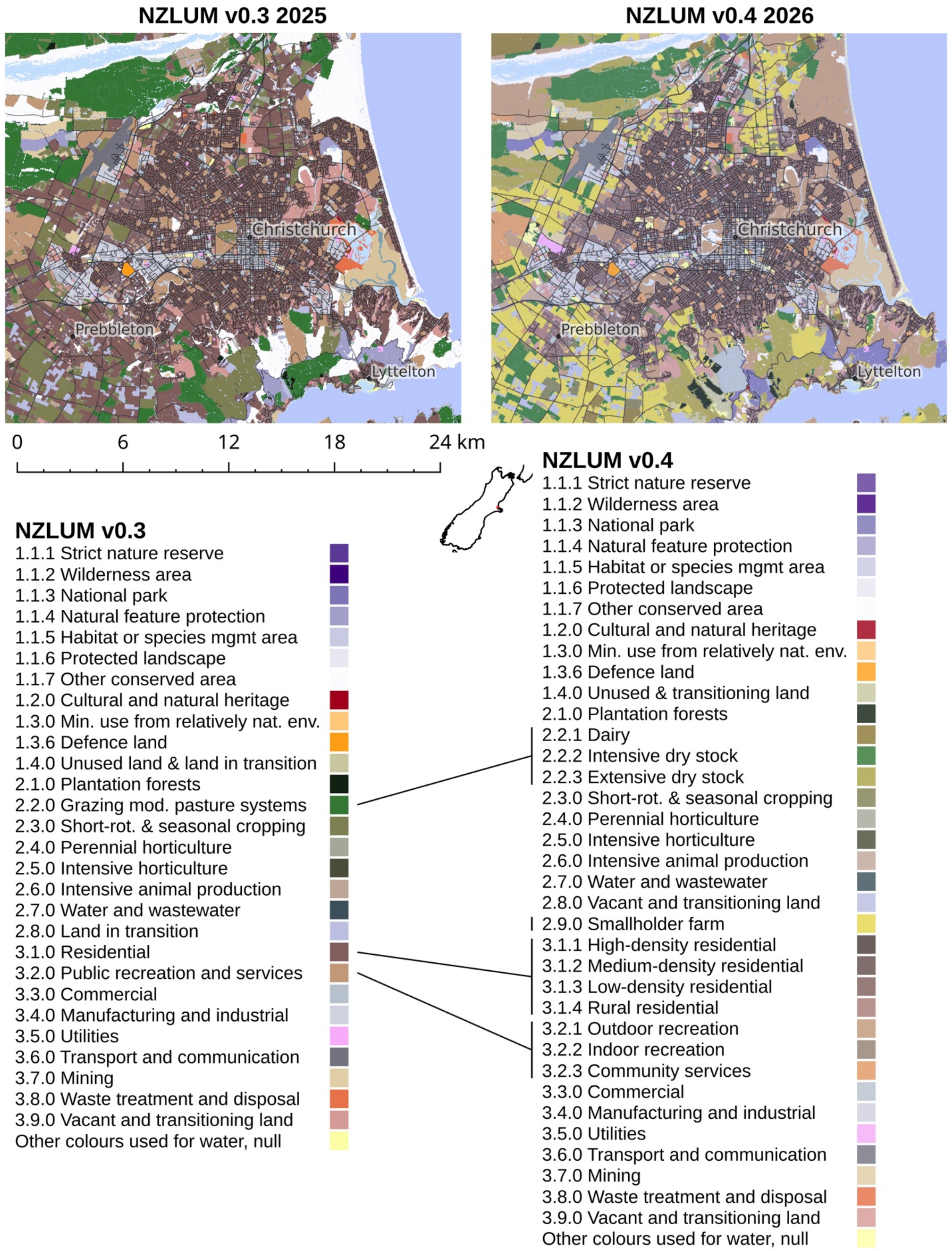

Figure 10. Comparison map focused on part of Christchurch, including an indication of additional classification detail added in NZLUM v0.4 2026.

6.1 Validation

Validation was performed similarly to 2025, with the exception that stratified random samples are drawn independently on 19 regional subsets of the land use map, rather than once over the national map. Sample size per stratum was not pre-determined; instead, it was computed using the standard formula for estimating a proportion at a 95% confidence level (z = 1.96) and a 25% margin of error, with a finite-population correction, then we applied a floor function to achieve a minimum of 10 samples per stratum. Sampling was area-weighted using a log(1 + area) transformation, which biases selection toward larger polygons while dampening the influence of very large outliers: a polygon 100× larger in area receives only around 7× the sampling weight. This prevents extremely large areas dominating the sample when applying an area bias while conversely preventing the large number of small areas dominating the sample in the absence of any area bias.

We chose the per-region margin of error of 25% to keep the number of samples requiring human validation manageable. One validator was responsible for 13 of 19 regions, and another for 6. There was no redundant validation. When consolidated across all 19 regions, which vary in size but are broadly comparable, the combined margin of error approached 5.7% (25% / √19) for land use classes distributed across most regions. Hypothetically, for a class present in only one region, the margin of error would remain at 25%, although this would depend on how close its population is to the minimum sample size per stratum.

A Python command line tool for drawing stratified random samples from spatial data sets, as well as the QGIS plugin used to step through the samples efficiently, have been made available as open-source software under the GNU General Public License (GPL).

- Stratified random sampling: https://github.com/manaakiwhenua/spatial-stratified-sampling
- QGIS plugin (check-a-kea): https://github.com/manaakiwhenua/check-a-kea

Validation results

The validation results are shown in Figure 11. Note that the tertiary and secondary accuracies are shown separately in the central and right panels, with class labels in bold on the right chart indicating that the result is an amalgamation from tertiary classes. Also note that the error bars are a function not only of sample size (more samples, less error) but also variance of feature area within a class (the more area varies, the more error).

The left-hand confidence-calibration panel is not area-weighted; it shows simple polygon-count proportions per confidence bin (with bar width scaled to log-count to some indication of the distribution). This distinction between count and area-weighted accuracy matters because the two can diverge substantially. A class or bin dominated by a few large, easily classified polygons can show high area-weighted accuracy while still containing a majority of individually misclassified (but altogether small) polygons, or vice versa. *Note:* The colour palette in Figure 11 is also reused with a different meaning between panels: on the left it denotes the validation outcome itself (true-tertiary, true-secondary, maybe, false); on the central and right panels the same four colours instead denote the derived pass/marginal/fail category relative to the 80% threshold, not the raw outcome. *Readers should not carry the colour key from one panel to the next.*

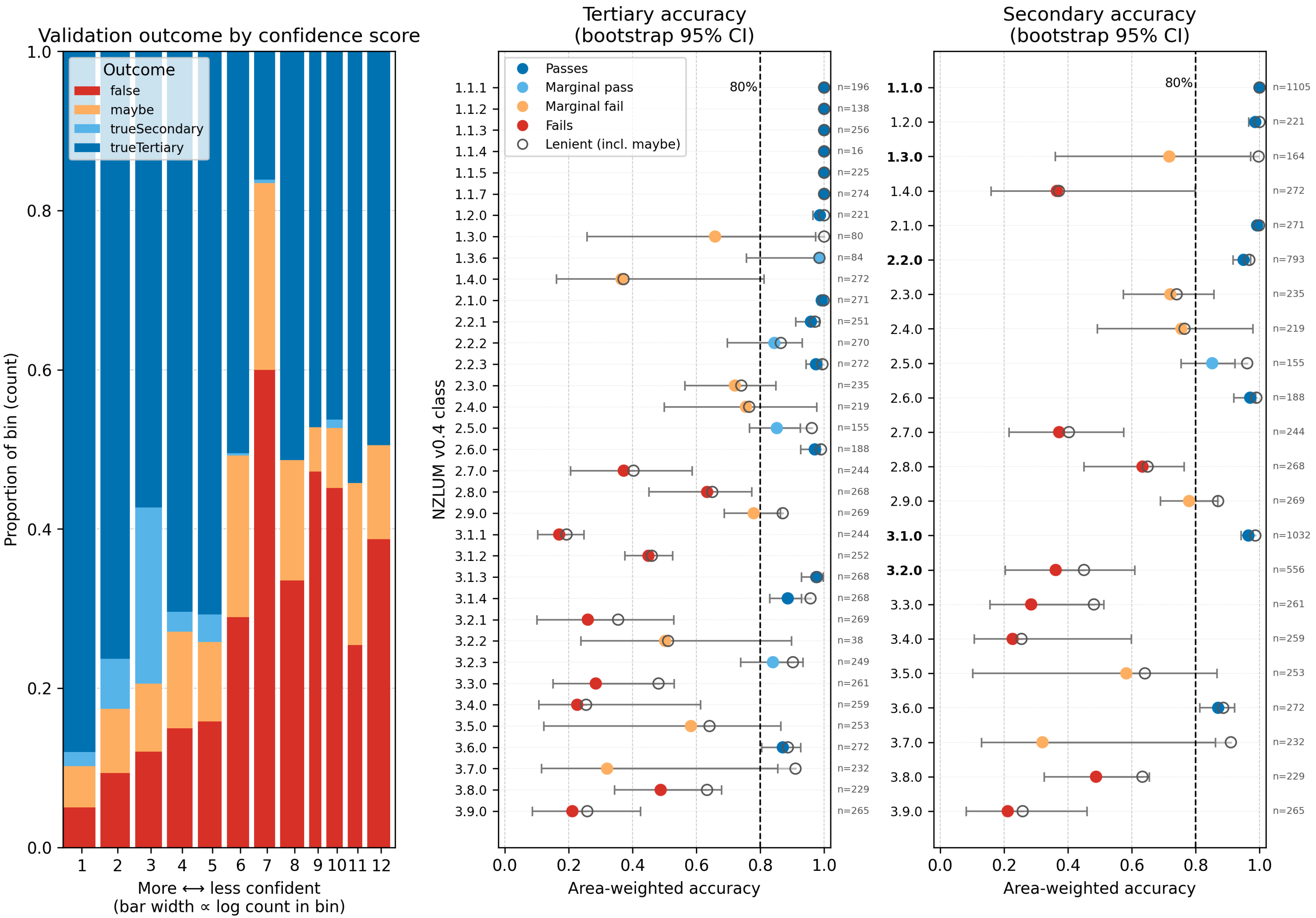

Figure 11. Validation results for NZLUM v0.4 2026. *Left*: proportion of validated polygons by outcome (true-tertiary, true-secondary, maybe, false) per confidence bin (classification confidence, not the validator's). *Centre and Right*: area-weighted accuracy per class at the tertiary (Centre) and secondary/amalgamated (Right) levels. Bold labels in the Right panel indicate classes merged from multiple tertiary codes. In both panels: filled dot = strict accuracy (true-tertiary only; true-tertiary + true-secondary on the Right), open circle = lenient accuracy (maybe counted as correct). Horizontal error bars are bootstrapped 95% confidence intervals of the strict estimate.

The points below present selected validation findings, with relevant discussion and caveats.

1 A single statistic indicating overall accuracy depends on whether area weighting is applied. Our samples were drawn with a muted bias towards larger areas such that larger features were more likely to be picked than smaller ones. Whether the size of sampled features should be accounted for in interpreting these results is important for assessing overall accuracy. The difference between area-weighted and count-based accuracy, and between a strict and lenient measure of accuracy, is shown in Table 1.

Table 1. Strict/lenient and area/count-based overall accuracy statistics

	Area-weighted		Count-based	
	Tertiary	Secondary	Tertiary	Secondary
Strict	98.9%	99.4%	71.7%	75.9%
Lenient	98.9%	99.4%	75.9%	85.1%

2 The area-weighted results are strongly determined by the presence of large features, especially protected reserves, which are generally accurately represented (though they may still be subject to errors of omission). To account for this, overall accuracy is perhaps best considered broken down further into the three primary classes (Table 2).

Table 2. Strict area/count-based overall accuracy, by primary class

Primary class	*n*	Count-based tertiary		Area-weighted tertiary	
		Strict	Lenient	Strict	Lenient
1.0.0 Conservation and Minimal Use	1,762	85.9%	94.2%	99.4%	99.8%
2.0.0 Production agriculture and plantations	2,642	73.2%	81.8%	93.5%	95.2%
3.0.0 Built environment	3,359	61.8%	72.0%	42.8%	59.2%

3 For primary Classes 1 and 2, area-weighting inflates accuracy relative to a count-based measure. This was expected: big areas tend to be easy to classify correctly (e.g. a National Park, or a large uniform grazing area).

4 However primary Class 3 (Built environment) inverts this relationship: while both accuracy statistics are low, its area-weighted strict accuracy (42.8%, 95% CI: 26.0%–62.4%) is lower than its count-based accuracy (61.8%). That means within class 3, the large-area polygons are disproportionately misclassified, while smaller Class 3 polygons are relatively more often correct. This is likely due to failures of classification for Class 3.2.1 (Outdoor recreation) and secondary Class 3.5.0 (Utilities). Validators noticed that both are apparently disproportionately large natural spaces that perhaps ought to be classified under Class 1 instead. Examples include peri-urban natural spaces used for recreation (insufficiently urban for classification under Class 3) and water reservoir areas (insufficiently intensely utility focussed under Class 3). Both classes are among the least accurate of all.

5 The least accurate classes (tertiary, strict) are 3.1.1 (High-density residential) at less than 20%, 3.2.1 (Outdoor recreation) at 25%, 3.5.0 (Utilities) at 39%, and 3.9.0 (Vacant and transitioning land) at 44%.

6 High-density residential (3.1.1) has a 0% false rate, but only 12% true at the tertiary level. This means that it is consistent in having the correct secondary class (3.1.0 Residential) but not the appropriate tertiary class. The rules for determining 'high density' need revision (perhaps a higher evidential threshold), or further data is required for greater accuracy. LiDAR-derived building footprints with height could be an excellent indicator to include in the classification to improve the accuracy of this class.

7 The same is true for 3.1.2 (Medium-density residential): low rate of false, 52% true at the tertiary level, but 98% accurate at the secondary level.

8 The gap between strict and lenient accuracy is large for secondary Class 1.3.0 (Minimal use from relatively natural environments), from 73% to 93%, suggesting substantial inherent uncertainty in the validation of this class. Validation based on a remote desktop analysis from aerial imagery is simply insufficient to validate this class accurately; 'minimal use' as a concept is difficult to judge remotely. While this is true for all classes to some extent but is particularly true for all the 'vacant or transition' classes (1.3.0, 2.8.0, and 3.9.0).

9 The subclasses of secondary Class 2.2.0 (Grazing modified pasture systems), newly added in the 2026 map, tended to validate well, including Class 2.2.1 (Dairy) which perhaps reflects the considerable use of new dairy consenting data sets collated from regional councils. Intensive dry stock (2.2.2) passes marginally, while extensive dry stock (2.2.3) is very accurate. Further data is required to support the classification of intensive non-dairy grazing to bring the standard up the same level as 2.2.1 and 2.2.3.

10 Classes 2.3.0 (Short-rotation and seasonal cropping) and 2.4.0 (Perennial horticulture) failed marginally to meet the 80% accuracy threshold, indicating that more information is needed to support their classification.

11 In terms of our confidence calibration, we note the following.

a Confidence values 1–5 give a reasonable indication of validation performance, though not monotonically.

b Confidence Bin 1 (most confident, n = 2,738) was both the largest bin by area and count and is 88.0% correct by count at the tertiary level.

c Strict tertiary accuracy declined through Bins 2–5 (76.3%, 57.3%, 70.4%, 70.7%), then dropped sharply at Bin 6 (50.5%). Bin 7 (n = 230) was a clear outlier: only 16.1% correct, 60.0% outright false, and markedly worse than the lower confidence bins.

d Bins 8–12 (the low-confidence tail) fell within a noisy 46%–54% correct range, with false rates of 25%–47%.

e Bins 7–12 contained 1,265 samples, about 16.3% of the full 7,763 sample data set.

f 'Maybe' (orange shading in Figure 11, left panel) accounts for approximately 9.2% of sampled polygons overall, giving some measure of the overall effect of inherent validation uncertainty. 'Maybe' trended upward as confidence decreases: by 5%–8% in the most-confident bins (1–3), rising to 12%–24% through the middle of the range (Bins 4–7, peaking at Bin 7's level of 23.5%), 'Maybe' was then noisy in the low-confidence tail (Bins 9–12, several of which have small n). This means lower-confidence calls are disproportionately landing in ambiguous 'maybe' territory, indicating that even with direct consideration by a human validator there is ambiguity about the correct classification in low-confidence cases.

g Figure 12 shows the distribution of confidence scores recorded during validation, broken down by class and validation outcome. The chart is diagnostic: it shows how confident the classification was when it turned out to be wrong. Where a class's 'false' distribution sits toward the low-confidence end (e.g. Class 2.3.0, short-rotation and seasonal cropping) then errors are concentrated among classifications the model itself flagged as uncertain. This is a good pattern, as it means the confidence score is a useful predictor of reliability within that class. Conversely, where the 'false' distribution instead sits toward the high-confidence end (as with Class 3.7.0 [Mining], whose false distribution covers confidences 1–3) then the classifier is confidently wrong. That is a problem as it means the confidence score cannot be trusted as an indicator of reliability in the map.

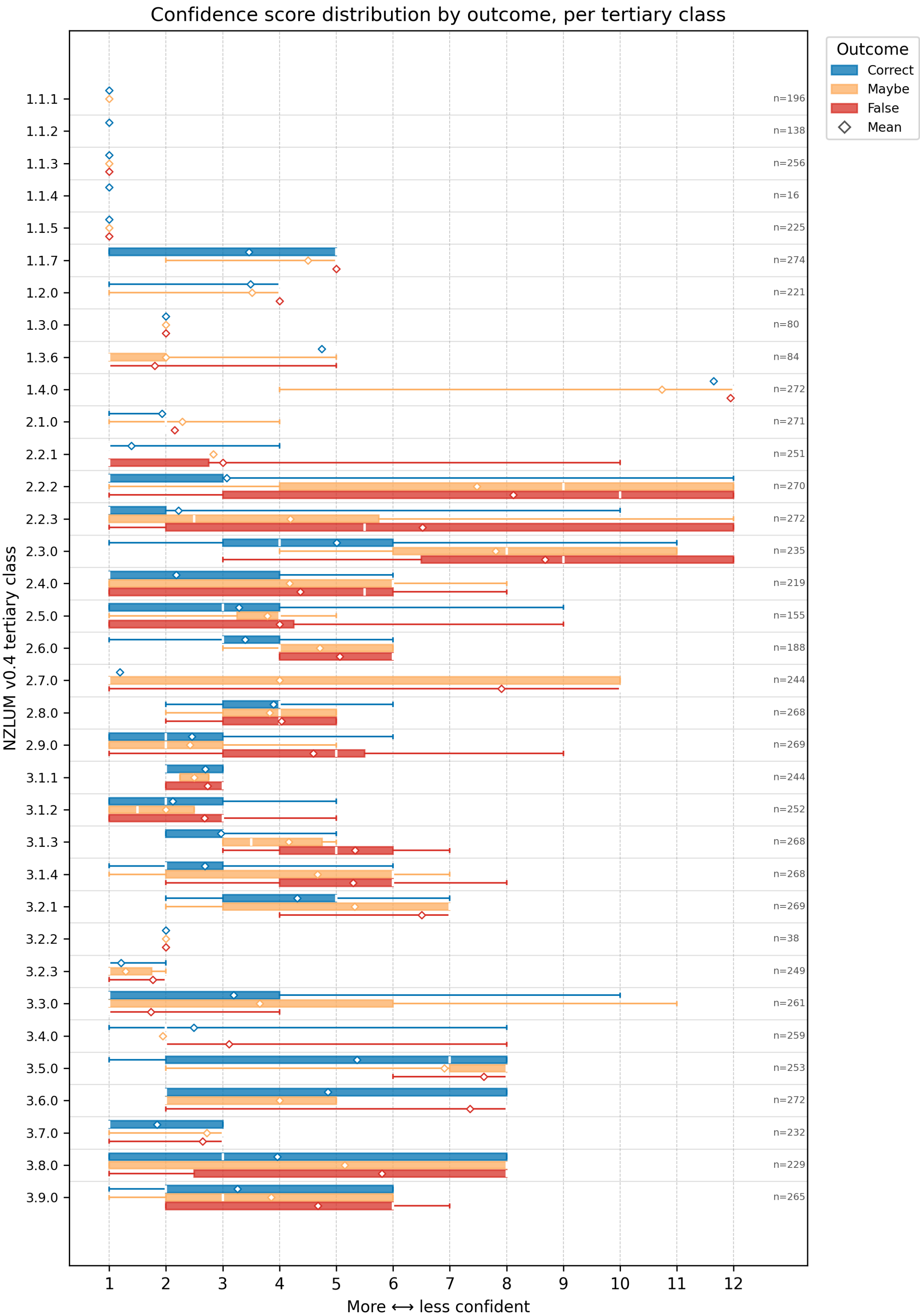

Figure 12. Confidence score distribution by validation outcome, per tertiary class. This is shown as three horizontal box-and-whisker plots per class: one for each set of polygons validated as correct, maybe, or false, using NZLUM's 1–12 confidence scale. Each box spans the interquartile range, the white line marks the median, whiskers extend between the 5th and 95th percentiles, and the white diamond marks the mean. *N* is shown at right and represents the polygon count per class.

6.2 Improvements to LUIS software

Compressed DGGS representations

Earlier versions of the land-use information system (LUIS) software used to perform the map classification used the H3 discrete global grid system (DGGS)[3] at a single, fixed resolution. This involved a significant amount of computational resource and disk consumption as a lot of redundant information is written to, persistently stored on, and read from disk. We made an improvement to LUIS allowing all input data to be represented and stored using DGGS compression, such that large areas of uniform information (the interior of a large protected area, for example) can be represented with fewer rows in the database, without any loss of information. This improvement has improved performance so that it may be feasible to produce a national land use map using this software at a higher DGGS resolution in the next revision. This would be especially helpful for the representation of linear features (roads, rivers) and Class 3 areas.

Kart (geospatial version control)

The present version of LUIS now supports specification of input layers as Kart remote repositories. Kart is open-source software for distributed version-control of geospatial and tabular data, developed primarily by Koordinates.[4] Koordinates is the company that provides the Land Resource Inventory System (LRIS), as well as the LINZ Data Service (LDS), Stats NZ Geographic Data Service, and other geospatial data catalogues.

These catalogue and publishing platforms support data sources defined as third party ArcGIS REST API endpoints: the protocol by which almost all of these council consent data sets are publicly available. LRIS has been configured to track changes to all of the aforementioned council consent data sets on a weekly basis, with the change (if any) recorded automatically using Kart from within LRIS. The classification system can then refer to configured Kart repositories for a representation of the data at a specific point in time (or the nearest available) and use that specific snapshot of the input data in the classification. Without Kart, an ArcGIS REST API endpoint can only return the consent information at the date the request is made.

This method of using Kart is intended to allow future revisions to the classification system itself to be ‘replayed’ back through time, by using appropriate snapshots. However, at the time of writing this report only this first experimental step has been made, and only consenting data is being tracked in this way. However, Kart is used for LINZ topographic data, among other layers. Kart has proven to be a reliable and useful means of accomplishing this goal and we consider its use should be expanded to the point where all input vector data sets are consumed using this method in LUIS.

A related advantage of using Kart is that the clone (download) of the input data is checked for integrity (what is downloaded is guaranteed to be the same as what is available on the server). This is not guaranteed using an ArcGIS REST API endpoint, and we occasionally observed lost packets (essentially random holes in downloaded data) during the development of the 2025 map.

---

[3] For more information on H3 see: https://h3geo.org/

[4] See: https://koordinates.com/

7 Recommendations

7.1 Data and classification revision

1. *Future aspirations for input data acquisition should be based on validation performance at a class level, beginning with the classes that validate the most poorly.* Those that both validate poorly and have an inverse relationship between validation performance and stated confidence need the most urgent revision.
2. *Additional supplementary data, especially raster data (such as 10 m land cover maps made from Sentinel-2, or a LiDAR-derived canopy-height map), should be integrated into the land-use map*. Such data would be relatively straightforward to integrate and may help the classification of certain classes. These could be prioritised for use as “exclusions” on poor performing classes such as 3.5.0 (Utilities).
3. *While attention should still be given to encouraging councils to publish open data using an open standard, it is more important that councils just publish more data at all, especially asset registers to support utilities information*. The use of regionally inconsistent consenting data is necessary in the absence of a standard for the publication of this data.
4. *The independent production and subsequent integration of standalone crop and perennial horticulture maps would improve Classes 2.3.0 and 2.4.0 – and should be undertaken*. These maps could perhaps be produced using deep learning models. The two classes are important ones, and both failed marginally to meet the 80% accuracy threshold. With more information available, it could also be possible to map these to the tertiary level and increase both their thematic detail as well as validation accuracy. Classes 2.4.1 (tree crops), 2.4.2 (vine crops) and 2.4.3 (other perennial horticulture) would be of great interest to regional councils; as would 2.3.1 (arable cropping), 2.3.2 (arable and mixed livestock cropping), 2.3.3 (short-rotation horticulture), 2.3.4 (seasonal flowers and bulbs, and turf farming).
5. *In urban areas, we recommend a national mapping to the H3 DGGS resolution 12 as of benefit; and perhaps mapping urban areas separately mapped at resolution 13.* Mapping to the H3 DGGS resolution 11 to produce the national land use map is insufficient for the detail required for the map to be useful. Improvements made to the processing software during the production of the 2026 map have made the suggested mapping at higher resolution feasible.
6. *A version of the land use map using official property boundaries should be put before the NZLUSG for consideration.* This may be more useful for council staff and others working directly with property-scale information.
7. *Class 3.2.1 (Outdoor recreation; in a built-up context) currently validates poorly, and we recommend investigating changes to the classification rule so that it better considers whether an outdoor recreation area is or is not truly urban or at least peri-urban*. At present this is largely based on Stats NZ administrative urban-rural definitions, which often exhibit a very large peri-urban area which may lead to apparent misclassification.
8. *The definition of Class 3.5.0 (Utilities) should be revised by the NZLUSG* (e.g. whether natural water collection areas are rightly considered part of 3.5.0.)

7.2 Graduation from pilot status

1. *Based on the failure of the map validation to exhibit accuracy of 80% for all tertiary classes, we do not recommend publication of this layer without the continued use of a 'pilot' disclaimer*.
2. *We recommend that BSI and MCERT reconvene the NZLUSG group for a meeting to consider the 2026 land use map*. The group can also postulate further changes to the classification system (though these should become progressively minor to avoid end user disruption) and also to prioritise which tertiary classes should be mapped in future iterations.

Declaration of the use of generative AI/AI-assisted technologies

This research work included the use of Claude Code for assistance editing and maintaining the configuration files for the land use information system (LUIS) in-house software.

Primarily this assisted in finding and avoiding typographic errors and making repetitive additions reliably. All changes to the configuration files made for this revision are published openly and available at:
https://github.com/manaakiwhenua/luis-config-nzlum/milestone/1

Claude Code was also used to assist writing code to produce the charts shown in this report which summarise validation performance.

After using this tool, the content was reviewed and edited as needed by the authors.

8 References

Hughes P 2025. Cross-referencing legal protections on Land in New Zealand with the International Union for the Conservation of Nature Protected Areas Framework. Report prepared for the Ministry for the Environment (contract #27321). Available at: https://environment.govt.nz/assets/publications/cross-referencing-legal-protections-on-land-in-nz.pdf (accessed 30 October 2025).

Law R, Whitehead B, Cavanagh J, Ardo J, Harmsworth G, Harris L 2024. Land use information system – land use classification framework. Manaaki Whenua – Landcare Research Contract Report LC4488. Available at: https://nzlum.landcareresearch.co.nz/lc4488.pdf

Law RM, Ardo, J 2025. Using a discrete global grid system for a scalable, interoperable, and reproducible system of land-use mapping. Big Earth Data 9(1): 29–46. https://doi.org/10.1080/20964471.2024.2429847

Law R, Planzer S, Ardo J, Belliss S. 2025. Towards consistent land-use and management mapping: methodology and gap analysis for a pilot land-use map. Manaaki Whenua – Landcare Research Contract Report LC4620. Available at: https://nzlum.landcareresearch.co.nz/lc4620.pdf

Law R, Ardo J 2026. Addendum to Protected Areas Network of New Zealand (PAN-NZ). BSI Contract Report 2526-0156.